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ABSTRACT

A summary is provided of the goals, objectives, activities, and findings of Hudson County Community College's (HCCC's) comprehensive science evaluation project. After introductory material outlines the status of science education at HCCC, the project's objectives are presented; i.e., to analyze the college's science courses and their ability to prepare students for careers; to assess the adequacy of HCCC's science facilities; to identify the curriculum needs of HCCC's general education and basic skills programs; to examine approaches to science education used in various program areas; and to develop a science improvement plan for the development of curriculum and resources over a 5-year period. The report then describes the activities designed to achieve these objectives, beginning with the creation of a Science Improvement Plan Committee. Next, the report presents the results of: (1) a literature review; (2) a study of science education at colleges in New York and New Jersey; (3) a faculty survey focusing on their characteristics, background, and attitudes toward science and math requirements and electives, laboratory components for courses, minority student needs, and curriculum needs and objectives; and (4) a student survey investigating personal and academic characteristics, and attitudes and preferences regarding math, science, and computer science courses. Finally, a science improvement plan is presented. Appendices include the questionnaires and marginal frequency responses. (HB)

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COMPREHENSIVE SCIENCE EVALUATION PROJECT
HUDSON COUNTY COMMUNITY COLLEGE

Final Report, September, 1982
Minority Institutions Science Improvement Program
Design Grant
Project Number: 120AH17063

prepared by:

Mark Oromaner,
Project Director/Principal Investigator

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PREFACE

This final report represents the results of a comprehensive science evaluation project conducted at Hudson County Community College. This project was made possible through a grant (Project Number 120AH17063) awarded by the Minority Institutions Science Improvement Program of the United States Department of Education. The project involved the cooperation of students, staff, faculty and administrators. Members of the Science Improvement Plan Committee played a central role in all aspects of the project.

Rosa Casillas and Katherine McNeely assisted in the preparation of this report. A special debt of gratitude is owed to Jennifer Mast who assisted in all phases of this project from the preparation of the initial proposal to the preparation of this final report.

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I. INTRODUCTION

Hudson County Community College is licensed by the Board of Higher Education of the State of New Jersey and fully accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools. The fall, 1982 enrollment is approximately 3,500. Students are enrolled in one-year certificate and two-year degree programs. While the college offers courses at its various college centers, it also enters into contractual arrangements with other accredited postsecondary institutions for the use of faculty and facilities. All students are Hudson County Community College students, pursue community college programs, and receive certificates or degrees issued by the community college. At present contractual relationships exist with three cooperating institutions: Jersey City State College, Saint Peter's College, and New Jersey Institute of Technology.* In almost all cases students attend classes at either one of the cooperating colleges or the college centers. There are exceptional circumstances that require a split schedule.

The college was awarded a Minority Institutions Science Improvement Program Design Grant to conduct (8/01/81-07/31/82) a comprehensive science evaluation project. This project focused on science course requirements, science facilities, and science needs. While the college offers allied health, business, public and human services, and technology programs and requires that each degree candidate complete at least 21 general education credits, no general or introductory level science courses are offered at the college centers. The main reason for this

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* Prior to the fall 1982 semester, technology programs were offered through a contractual arrangement with Stevens Institute of Technology.

deficiency is the lack of laboratories. The recently developed Science and Technology Center provides a site for the development of such laboratories.

The open access policy of the college results in a situation in which a number of students enter with no formal exposure to science education. In addition, the level of scientific literacy required in many occupations and of informed citizens suggests that high school science courses may not be sufficient. Since more than 50 percent of the students at Hudson County Comunity College are over the age of 25, it is likely that recent revolutionary developments in physics, biology, and chemistry have made their scientific knowledge obsolete.*

In order for the college to fulfill its mission of providing quality education to the residents of Hudson county, N.J., the college has placed science development among its major commitments.

The activities of this project were coordinated by the Science Improvement Plan Committee. The proposed objectives (section II) and activities (section III) of the project have been accomplished. The next stage in the implementation of the college's science improvement plan calls for the development of an Institutional Proposal to be submitted to MISIP. That proposal will be based on the findings and conclusions contained in this report.

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* The college offers certificate and degree programs in computer sciences. The mathematics and social science offerings are also sufficient to meet the needs of the college's students.

II. PROJECT OBJECTIVES

The statement of project objectives which appears below has been taken from the college's MISIP proposal.

The objectives of Hudson County Community College's MISIP Design Grant Project are as follows:

- To conduct a comprehensive analysis of the College's science courses in regard to their ability to adequately prepare students for careers in the fields in which HCCC offers degree and certificate programs
- To conduct an assessment of the adequacy of the College's available science facilities including library materials, equipment, and laboratories
- To identify the physical (Technology), biological and social science curriculum needs of the College's General Education and Basic Skills programs
- To examine the College's approach to science instruction in the specific degree and certificate programs, the Bilingual Option, the General Education offerings, and Basic Skills courses
- To develop an institution-wide science improvement plan for the development of science curriculum and resources over a five-year period

In order to achieve the above objectives, the college will undertake a series of activities beginning with the establishment of a Science Improvement Plan Committee.

The Science Improvement Plan Committee was established at the beginning of the project. The committee is chaired by the Dean of Academic Affairs and includes representatives from each of the science related, mathematics, basic skills and bilingual programs. The Dean of Administration is also a member.* The Dean of Academic Affairs, the Dean of Administration and their staffs conducted the activities of the project.** The results of these activities were brought to the committee. The deliberations of the committee were communicated to the college's Academic Council and to the President's Cabinet.

As a result of the evaluation of the college's science needs, a Science and Technology Center was established during the summer, 1982. At present students in the electronics technology program take their courses at this location. The college has equipped the necessary laboratories associated with that program. The college has been awarded a federal vocational education grant (FY'83) for a project entitled "Integration of Microcomputers in Electronics Technology Curriculum." The equipment acquired through that grant will supplement the existing computer equipment in the Learning Center and in the Computer Center.

There are four science related programs at Hudson County Community College. These are: Electronics Technology, Chemical Laboratory Technology, Medical Record Technician, and Medical

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* A membership list of the Science Improvement Plan Committee appears in Appendix A.

** These activities are described in section III "Project Activities."

Assisting. An analysis of the courses in each of these programs and of graduates of the programs indicates that the programs are successful in preparing students for careers in the area of their training.* The plans of the college call for the expansion of the present technology programs and the development of new technology and engineering programs. The college plans also call for the development of additional allied health programs. While specialized courses are offered in the technology and allied health programs, the college does not offer general science courses nor does it have laboratories for general science, chemistry or biology classes. Chemistry courses are taken on the campus of New Jersey Institute of Technology, while biology courses are taken on the campus of Jersey City State College. These arrangements are accomplished through contractual agreements between Hudson County Community College and each of these cooperating colleges. The fact that we do not offer general science courses means that students may have to take specialized courses without prior exposure to fundamental courses. Faculty in allied health and technology have suggested that their students would be better prepared for their programs if they had prior exposure to such courses.

The absence of general science courses limits the general education options available to all students at the college. At present it is possible for a student in business or public and human services programs to graduate without an exposure to

* During the summer, 1982 the Medical Assisting and Medical Record Technician programs received full accreditation from their respective professional associations and the Committee on Allied Health Education and Accredition of the American Medical Association.

one laboratory science course. In order to expand the general education options, students must be provided with the opportunity of taking a laboratory science course. Some level of scientific literacy is necessary to function as an informed citizen. Finally, the existence of such courses will attract students to science and science related programs. Hudson County Community College is an open access institution. We are philosophically committed to this policy. One result of this commitment is that a number of students who enroll have had no high school science. The community college provides the last opportunity for such students to acquire some familiarity with scientific approaches, concepts and methodology.

The library holdings of the college are sufficient for the courses offered in the existing programs. The college has an ongoing periodicals and books acquisition program. In addition to the college's holdings at Hudson County Community College's Learning Center and at the Science and Technology Center, all Hudson County Community College students have access to the library at Jersey City State College. Technology students also have access to the library at New Jersey Institute of Technology. The development of additional laboratories at the Science and Technology Center will necessitate the acquisition of additional library holdings to be placed at that site.

The combination of the MISIP grant and the college's contribution of additional staff time has made it possible to achieve the objectives of this project. The major activities

conducted, quantitative results of these activities, and a comparison between science education at Hudson County Community College and science education offered at two-year colleges throughout the country and in the region are presented in section III "Project Activities."

The Science Improvement Plan Committee will continue to function. The committee will contribute to the formulation of an Institutional Proposal to be submitted to MISIP. The committee will also continue to contribute to long range plans of the college.

III. PROJECT ACTIVITIES

The statement of the project activities which appears below has been taken from the college's response (April 21, 1981) to the concerns of the MISIP panel and staff (March 30, 1981) regarding the original proposal.

- To conduct need assessments
- To analyze institutional science resources
- To examine alternative modes of science instruction
- To design and disseminate questionnaires to students and faculty concerning science needs, strengths, and weaknesses
- To interview faculty and administrators concerning science needs, strengths, and weaknesses
- To visit other two year colleges with similar student bodies
- To analyze all data

- To present an interim report to the Science Improvement Plan Committee
- To work with the Science Improvement Plan Committee in the development of recommendations and a final report

The recommendations and final report will be submitted to the Academic Council of the college. It will be on the basis of this report that the college will develop a MISIP Institutional Proposal.

While some of these activities have been discussed in the previous section, the major activities are presented in this section. Committee members agreed that it was not necessary to conduct visits to other two-year colleges. In lieu of such visits, catalogues of comparable institutions were examined. Members of the staff and faculty associated with Hudson County Community College have the requisite knowledge for the development of appropriate science courses and laboratories. The activities are presented under the headings of: Literature Review, Science at Colleges In The New York/New Jersey Area, Faculty Survey* and Student Survey.**

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* The faculty questionnaire, including the marginal frequency responses, appears in Appendix B.
** The student questionnaire, including the marginal frequency responses, appears in Appendix C.

The nature, adequacy, and extent of scientific education and literacy of all segments of the American population have been topics of increasing discussion and investigation. Since the approximately 1,300 community colleges in the nation enroll over four million students, one would expect this national concern to be reflected in the literature focusing on the community college. Recent publications support this expectation. A 1979 NSF sponsored survey of administrators, faculty, and students at 168 community colleges was conducted to assess perceptions of the status of science education (Westat, 1980). At approximately the same time, an issue of New Directions For Community Colleges (Brawer, 1980) was devoted to "Teaching the Sciences." This volume contains articles devoted to teaching innovations in a number of sciences and a bibliography of science teaching in two-year colleges.

A number of studies utilize common data collected from 175 community colleges (Brawer and Friedlander, 1979). These data include a review of the literature on 12 disciplines under NSF purview, catalogs and class schedules, and responses to questionnaires. The subjects covered and the percentage of colleges offering each subject are: sociology (100), psychology (100), biology (100), economics (99), mathematics and computer sciences (99), chemistry (97), interdisciplinary natural science (93), physics (91), engineering science and techniques (87), earth/sciences (84), anthropology and interdisciplinary social sciences (79), and agriculture and natural resources (67). Brawer and Friedlander (1979:10) point out that while many

community college students are academically underprepared, "with the exception of mathematics, academic departments do not frequently address courses to the learning needs of this growing segment of the two-year college student population." They (Brawer and Friedlander, 1979:23) go on to provide one explanation for this:

> Scientific literacy is also inextricably interwoven with reading ability. Identification of students with reading problems, the use of reading tests as entry level prerequisites to courses, and reading remediation for students who require this type of intervention may all be necessary before students can acquire even the basic rudiments of scientific knowledge.

An analysis (Clowes, 1980) of the function (transfer, general education, work, and remediation) of science courses reveals that instructors usually perceive their science courses to have more than one function and that while transfer, general education, and work functions are frequently combined, the remediation function appears to be a discrete area. While 33 percent of mathematics courses are remedial/developmental, the percentage for the various science courses ranges from 13 for chemistry, to 7 for integrated sciences, to approximately 2 for biology and physics (Cohen and Brawer, 1980:233). Cohen and Brawer suggest that the comparatively high figures for chemistry may be due to the requirements of allied health programs. The majority of the 168 sections of natural science courses examined by Cox (1980:39) were designated for general education.

This brief review suggests that within the community college sector: (a) science courses are likely to be available to transfer students, to general education students, and to work

oriented students, (b) identical courses are likely to be offered to students in the these three categories, and (c) it may not be educationally feasible to offer science courses to students in remedial/developmental programs. While students at Hudson County Community College may continue their education at four-year institutions, the programs at the college culminate in certificates or Associate in Applied Science (AAS) degrees. That is, the programs are career oriented. Brawer and Friedlander (1979:22) recommend that students in programs of this nature "should be afforded the opportunity of taking a science or social science course suitable for their abilities and interests."

SCIENCE AT COLLEGES IN THE NEW YORK/NEW JERSEY AREA

The New Jersey Department of Higher Education requires that Associate in Applied Science degree programs contain a minimum of 20 general education credits. There is no specification of course distribution within this requirement. At present various groups within the state system are working on a more detailed definition of general education. A number of proposals contain the requirement that Associate in Applied Science programs include science courses within general education offerings.

In order to obtain data on present science requirements for the AAS degree at New Jersey community colleges, catalogues of 12 of the 16 colleges (excluding Hudson County Community College) in the state were examined. Seven catalogues indicate a general statement concerning the distribution of science/mathematics

requirement in AAS programs. These statements are:

Atlantic Community College - AAS degree requires 6 credits of Laboratory Science and/or Math.

Burlington Community College - One course from courses numbered 100 or above from biology, chemistry, geology, geography, mathematics, physics, or physical science, or Introduction to Logic.

Essex County College - Math or Science (6-8 credits).

Mercer County Community College - "Natural Science and Technology. Two courses or demonstrated by minimum proficiency."

Middlesex County College - "A minimum of three credits in mathematics or science."

Ocean County College - "Six semester hours of mathematics and/or physical science."

Salem Community College - "All students, regardless of degree area, are required to take one or more courses in each of the following education areas: English, math, humanities, social science and science."

The remaining 5 catalogues do not present required distributions for AAS programs. In each of these cases individual programs were examined. The summary statement for each of these colleges is:

Cumberland County College - No science requirement for all AAS programs. Requirement varies according to program.

County College of Morris - There is a 3 credit science elective

(Natural Science or Introduction to Astronomy) for business AAS programs. Other AAS programs are in engineering related and allied health fields.

Passaic County Community College - No science requirement for all AAS programs. Requirement varies according to program.

Somerset County College - While no science requirement exists for all AAS programs, a science requirement does appear to exist in most programs.

Camden County College - No science requirement for all AAS programs. Requirement varies according to program.

Hudson County Community College is located in a county that is 100 percent urban. A majority of its students are minority students from low income families. In order to assess science requries at colleges with similar student populations, catalogues of 5 of the community colleges at the City University of New York were examined. The summary statement for each of these colleges is:

Bronx Community College - The general requirement appears to be biology or astronomy (3-4 credits). It is also recommended that students who may later transfer to a four-year college substitute a laboratory science from among biology, chemistry, physics, or astronomy.

Hostos Community College - While there appears to be a science requirement for each of the AAS degrees, the requirement varies with program. The courses are: natural science (4 credits), anatomy and physiology I & II (8 credits), and biology (4 credits).

Kingsborough Community College - The following appears to be a requirement in each of the AAS degree programs. Biological science, mathematics and computer science, or physical science (4 credits).

Queensborough Community College - The following appears to be a requirement in each of the AAS degree programs. Laboratory science course selected from biology, chemistry, geology, or physics (4 credits).

While science requirements for the AAS degree differ among these colleges, students at each of these institutions have an opportunity to take science courses. The recently developed Science and Technology Center at Hudson County Community College provides the college with a facility at which it can offer laboratory based science courses. In order to offer such courses, additional laboratories must be developed. At present the only laboratories at the site are laboratories associated with the electronics technology program.

FACULTY SURVEY

A questionnaire was distributed to 214 instructors. The return rate was approximately 50 percent (104). The faculty questionnaire, including the marginal frequency responses, appears in Appendix B. While the questionnaire deals with numerous aspects of science/mathematics education at the college and the role of computers in the educational process, this discussion focuses on the responses to questions concerning science education at Hudson County Community College.

At the time of the distribution of the questionnaire the respondents were teaching courses in 23 academic areas (Q.9).* Their highest degrees represent 25 fields of graduate study (Q.8). Seventy-five percent had been teaching at the college for more than one year, while 30 percent had been with the college for more than 4 years (Q.11). These data indicate that respondents have had an opportunity to develop a familiarity with the college, its programs, and its students.

Eighty-five percent (85 of 101) of the respondents answered yes to the question: "Should the college institute a science requirement for degree program students?" (Q.18). Eighty-seven percent (90 of 104) either agree or strongly agree with the statement: "All students at the college should be exposed to a core curriculum which includes at least one science course" (Q.30). The percentage of instructors indicating that a science requirement is appropriate for each of the college's programs (Q.19) is:

Accounting**	69 (94)***
Child Care	80 (99)
Criminal Justice	78 (96)
Data Processing	83 (97)
Human Services	79 (97)
Management	78 (96)
Public Admistration	71 (94)
Real Estate & Insurance	57 (91)
Secretarial Studies	58 (89)

A majority is in support of both the general proposition concerning a science requirement and of the specific proposition concerning a science requirement for each of the college's programs.

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* Number in parenthesis refers to item in questionnaire. Questionnaire appears in Appendix B.

** Each of the following programs has a science requirement: Electronics Technology, Chemical Laboratory Technology, Medical Assisting, and Medical Record Technician.

*** Total number of responses.

There is almost universal agreement (99 of 101) that if the college were not to institute a science requirement, the college should make science courses available as electives (Q.22).

The frequency distributions of titles suggested for the required (Q.20) or elective (Q.23) science courses* are:

	Required Science Courses		Elective Science Courses	
	N	%	N	%
General Science (Principles, Introduction, Fundamentals, Basic)	44	44	39	37
Biology (Survey, Introduction, Principles)	25	25	27	25
Chemistry (Introduction, General, Basic)	17	17	18	17
Physics (Introduction, General)	11	11	12	11
Science, Technology & Society	8	8	5	5
Man & His Environment	4	4	6	6
Total	101	101	107	101

The rank order of courses is identical for both required and elective alternatives. In each case the general science course is the modal response. The fact that biology is the second most frequently mentioned option may be due to the fact that the college's two allied health programs (medical record technician and medical assisting) include anatomy & physiology courses. Instructors in each of these programs have indicated that their students would benefit from a laboratory science course before they enroll in the the anatomy & physiology courses.

*Responses indicating mathematics, computer science, and social science courses are not included.

While a general science course would provide a foundation for advanced courses in allied health and technology programs, the benefits of such a course are not limited to these students. Seventy-eight percent of the instructors either agree or strongly agree with the statement: "One general science course would make an important contribution to the ability of non-science graduates to participate in a more informed manner in roles as citizens" (Q.30).

Both the career oriented goal associated with the allied health and technology programs and the informed citizenship goal are consistent with the educational philosophy of Hudson County Community College. The college's comprehensive self-study (Hudson County Community College, 1980;II-2) contains the following expression of the college's philosophy:

> Members of the Hudson County Community College community subscribe to the fundamental position that democratic society requires the extension of some form of education to virtually every member of the population. In addition, they recognize one of the principal functions of our educational institutions to be the enhancement of individual capabilities and the simultaneous contribution to self-realization. Finally, they recognize that educational institutions serve the welfare of the broader society by preparing individuals to play effective roles as citizens and participants in the occupational structure.

Students who are not academically prepared to master certificate or degree level work must take remedial/developmental courses in reading, English, and mathematics. Credits for these basic skills courses are not included in the credits for degrees and certificates. No student who is deficient in one of the basic skills areas is permitted to take a college level course in that area. While 72 percent of the respondents (Q.27) indicate

that a basic skills science course should be added to the basic skills offerings, the college does not plan to develop such a course. Basic skills students must concentrate on the fundamentals of reading, English, and mathematics, This position is consistent with the previously quoted observation of Brawer and Friedlander (1979:23) that reading testing and remediation "may all be necessary before students can acquire even the basic rudiments of scientific knowledge." However, the development of scientific laboratories will permit instructors in basic skills courses to integrate science oriented material into their courses. Since minority students constitute a larger percentage of basic skills students than of the college as a whole, this exposure will provide an opportunity to attract a larger number of minority students to science courses and science oriented programs.

STUDENT SURVEY

Three hundred and eighty-three questionnaires were distributed to students in selected sections of basic skills (Foundations) courses (90), bilingual courses (100), and certificate or degree (Program) courses (193). The inclusion of students from these three categories guaranteed that all segments of the student population would be represented in the sample. The student questionnaire, including the marginal frequency responses, appears in Appendix C.

Full-time (194) and part-time (184) students are almost equally represented among the respondents (Q.8).* Students are represented from every program with the exception of the recently established certificate in marine technology (Q.11). One hundred and eighty-five (48%) of the students are Hispanic, 84 (22%) are black, and 61 (16%) are white (not of Hispanic origin) (Q.3). Fifty-six percent of the students were not born in the United States (Q.4). Spanish is the native language of 182 (85%) of the 215 students for whom a language other than English is the native language (Q.7). The shape of the age distribution is one indication of the non-traditional nature of the student population (Q.2) The age distribution is: below 20 (13%), 20-24 (33%), 25-29 (15%), 30-34 (15%), 35-39 (11%) and 40+ (11%). Finally, the open access policy of the college is reflected in the finding that 66 students (17%) did not complete 12 years of education before they entered Hudson County Community College. As one might expect, foundations students (27%) are more likely than are bilingual (15%) or program (14%) students not to have completed 12 years of prior education.

While this questionnaire includes items concerning science, mathematics, and computer science education, we will follow the format of the faculty survey section and focus on the science items.

* Number in parentheses refers to item in questionnaire. Questionnaire appears in Appendix C.

Biology (199), general science (173), chemistry (110) and physics (92) are the science courses most likely to have been taken before the students entered Hudson County Community College. Fourteen percent (52) of the students completed no high school or college science courses before they entered the college. Students in the bilingual program (23%) are more likely than are foundations students (12%) or program students (9%) not to have taken a science course prior to their enrollment (Q.14).

While 52 percent of the students strongly agree or agree with the statement "All graduates of Hudson County Community College should take at least one science course," only 18 percent disagree or strongly disagree. The remaining students are either undecided or don't know, or failed to respond to the statement. Students in bilingual courses (64%) are the most likely to support the need for at least one science course, while foundations students (43%) are the least likely to indicate support (Q.18). A related and consistent finding is that 16 percent of the students state that they would not like to take any science or technology courses. Bilingual students are the least likely (9%) to give this response, while the foundations students (19%) are the most likely (Q.19).

Twelve percent agree or strongly agree that "Most science courses are too difficult for me," while 50 percent disagree or strongly disagree. Once again, the remaining students are either undecided or don't know, or failed to respond to the statement. There are no major differences among the groups in the percent of students who indicate that most science courses are too difficult for them (Q.18).

Students were requested to indicate the kind of science course they would prefer to take if a science requirement were instituted (Q.19). Students were presented with alternatives. The rank order of courses is: general science (162), biology (97), chemistry (63), and physics (40). The only deviation from this aggregate order is that bilingual students reversed the positions of chemistry (17) and biology (13) (Q.19). The order generated from student responses is identical to the order generated from faculty responses.

CONCLUSIONS

On the basis of a Minority Institutions Science Improvement Program Design Grant, Hudson County Community College has been able to engage in a comprehensive evaluation of its science needs. The focus of this evaluation has been on the needs in the physical, biological and chemical sciences. The courses, equipment, and faculty in the areas of mathematics, computer science and social science are sufficient to meet the requirements of our programs and students. As a result of the research reported in this document, the college has formulated a science improvement plan. The goals of this plan are:

- Development of a general science course
- Development of an introductory level biology course
- Development of an introductory level chemistry course
- Development of laboratories for general science and introductory level biology and chemistry courses. These laboratories will be developed at the recently

established Science and Technology Center

- Integration of science material into the existing basic skills courses in reading, English, and mathematics. This will include an exposure of basic skills students to the science laboratories
- Continuation of the Science Improvement Plan Committee
- Submission of an Institutional Proposal to MISIP for the development of general science and introductory level biology and chemistry laboratories

The implementation of this plan will guarantee that every student at the college will have an opportunity to take a laboratory science course, that community residents who are interested in science may take a laboratory science course, and that students in science related programs will have a strong science foundation before they enroll in specialized courses. The implementation of this plan will make a significant contribution to the college's ability to achieve its educational mission.

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APPENDIX A

SCIENCE IMPROVEMENT PLAN COMMITTEE

SCIENCE IMPROVEMENT PLAN COMMITTEE

Mark Oromaner (Chairman)	- Dean of Academic Affairs
Michael J. Mahon	- Dean of Administration
Ramon L. Bonachea	- Associate Dean, Bilingual Education
Beverley Garbaccio	- Chairman, Basic Skills
Manuel Gomez	- Chairman, Public and Human Services
Joseph J. Moeller	- Chairman, Technology
Bernice Trambert	- Chairman, Allied Health
Joseph DeGuilmo	- Coordinator, Electronics Technology
Nancy Deluca	- Coordinator, Chemical Laboratory Tech.
J. Allison McCluer	- Coordinator, Social Sciences
Terrance O'Brien	- Coordinator, Mathematics
Victor Mastro	- Instructor, Mathematics

APPENDIX B

FACULTY SURVEY

MISIP FACULTY SURVEY

1. Sex	Male	67
	Female	36
	No Answer	1
2. Age	Below 25	1
	25-29	11
	30-34	24
	35-39	20
	40-44	14
	45-49	14
	50+	15
	No Answer	5

3. How would you classify yourself?

Black, not of Hispanic origin	2
Asian (Oriental) or Pacific Islander	2
Hispanic	14
White, not of Hispanic Origin	83
Alaskan Native or American Indian	1
Other	1
No Answer	1

4. What position do you hold at HCCC?

Full time faculty member	17
Adjunct	87

5. How many classes are you currently teaching?

5 classes	3
4 classes	8
3 classes	15
2 classes	30
1 class	48

6. If you answered "adjunct" to question 4, what is your full-time occupation or employment?

Technical/Professional	18
Business	15
Independent Professional	1
Academic/Teacher	41
Criminal Justice/Social Service	8
Other	1
No Response	20

7. Your highest earned degree?

M.D. or J.D.	2
Ph.D or Ed. D	9
Master of Philosophy or ABD (all but dissertation)	9
M.B.A. or M.S.W.	10
M.A.T., M.Ed., M.A. or M.S.	58
B.A. or B.S.	13
Other	2
No answer	1

8. What is the Academic Field in which you did your graduate study?

Accounting	3	Language	4
Administration	1	Law	1
Art	1	Literature	7
Chemistry	6	Marine Science	1
Criminal Justice	1	Math	8
Education	18	Physics	1
Economics	1	Psychology	3
Engineering	4	Reading	2
English	8	Social Work/Psych	4
E.S.L.	1	Sociology	1
Finance	3	Speech	1
Guidance	2	Student Personnel	4
Health	4		
		No Answer	14

9. List the course(s) you are teaching at present.

Accounting	7	Management	3
Anatomy	1	Marine Technology	4
Basic Skills	10	Marketing	2
Communications	7	Math	15
Chemical Technology	5	Medical Assisting	4
Child Care	2	Medical Records	1
Data Processing	6	Nutrition	1
Economics	1	Psychology	6
Electronics Tech.	8	Public Administration	3
E.S.L.	10	Reading	2
GED	1	Typing	2
Human Services	1		
		No Answer	2

10. Please list additional courses you have taught at HCCC.

Accounting	4	Management	3
Basic Skills	9	Marine Technology	1
Chemistry	5	Math	12
Child Care	2	Medical Assisting	4
Consumer Behavior	1	Medical Records	1
Data Processing	6	Nutrition	1
Economics	1	Psychology	6
Electronics Tech.	7	Public Administration	1
English	5	Reading	1
E.S.L.	4	Secretarial Studies	1
G.E.D.	2	Taxation	1
Human Services	1		
		No Answer	25

11. How many semesters have you been teaching HCCC students?

1 - 2 semesters	26
3 - 4 semesters	16
5 - 6 semesters	17
7 - 8 semesters	15
9 or more	30

12. On the basis of your experience at the college, how adequately prepared in mathematics are HCCC students?

very well prepared	3
well prepared	2
prepared	25
not well prepared	32
not prepared	4
don't know	38

13. How do you rate your familiarity with computer assisted instruction?

very familiar	10
somewhat familiar	22
familiar	28
not very familiar	25
not familiar	19

14. How important is computer assisted instruction in science and mathematics?

very important	37
somewhat important	12
important	25
of little importance	5
not important	0
don't know	24
No Answer	1

15. How adequate are the college's present computer assisted instructional opportunities to meet the needs generated by additional science and mathematics courses?

very adequate	2
somewhat adequate	8
adequate	6
not very adequate	13
not adequate	9
don't know	66

16. How important is it for students taking at least one math course to be able to use computers in their college work?

very important	24
somewhat important	14
important	28
of little importance	12
not important	4
don't know	21
No Answer	1

17. How important is it for students taking at least one science course to be able to use computers in their college work?

very important	18
somewhat important	16
important	32
of little importance	10
not important	5
don't know	21
No Answer	2

18. Should the college institute a science requirement for degree program students?

yes	85
no	16
No Answer	3

19. If the college were to institute a science requirement, indicate whether such requirement is appropriate for each of the following degree programs?

Accounting	yes	64
	no	30
	No Answer	10
Data Processing	yes	80
	no	17
	No Answer	7
Management	yes	74
	no	22
	No Answer	8
Secretarial Studies	yes	51
	no	38
	No Answer	15
Human Services	yes	76
	no	21
	No Answer	7
Public Administration	yes	66
	no	28
	No Answer	10
Criminal Justice	yes	74
	no	22
	No Answer	8
Child Care	yes	79
	no	20
	No Answer	5
Real Estate & Insurance	yes	51
	no	40
	No Answer	13

(At present, each of the following programs has a science requirement: Electronics Technology, Chemical Laboratory Technology, Medical Assisting and Medical Record Technician).

20. If the college were to institute a science requirement, indicate title of appropriate course(s). If possible, please include a brief description of each course.

Most frequently given responses.*

General Science (Principles, Introduction, Fundamentals, Basic)	44
Biology (Survey, Introduction, Principles)	25
Chemistry (Introduction, General, Basic)	17
Physics (Introduction, General)	11
Science, Technology & Society	8
Man & His Environment	4

*Responses indicating mathematics, computer science, and social science courses not included. Twenty-nine individuals did not respond.

21. For each course(s) listed in question 20, please indicate whether or not a laboratory is a necessary component.

Laboratory requirements for most frequently listed science courses.*

	Yes	No
General Science	17	27
Biology	16	9
Chemistry	14	3
Physics	7	4
Science, Technology & Society	1	3
Man & His Environment	1	3

*Thirty individuals did not respond.

22. If the college were not to institute a general science requirement, should the college make available general science courses as elective for degree students?

yes	99
no	2
No Answer	3

23. Indicate title of appropriate course(s). If possible, please include a brief description of each course. (If these are the same courses which appear in question 20, please list courses but do not repeat description).

Most frequently given responses.*

General Science (Principles, Introduction, Fundamentals, Basic)	39
Biology (Survey, Introduction, Principles)	27
Chemistry (Introduction, General, Basic)	18
Physics (Introduction, General)	12
Science, Technology & Society	5
Man & His Environment	6

*Responses indicating mathematics, computer science and social science courses not included. Thirty-five individuals did not respond.

24. For each course(s) listed in question 23, please indicate whether or not a laboratory is a necessary component?

Laboratory requirements for most frequently listed science courses.*

	Yes	No
General Science	12	22
Biology	14	8
Chemistry	12	4
Physics	6	4
Science, Technology & Society	1	1
Man & His Environment	0	6

*Forty-three individuals did not respond.

25. Should the college institute a math requirement for degree program students?

yes	97
no	3
No Answer	4

26. At present, a math requirement exists in all degree programs except those programs listed below. In each case indicate whether or not the college should institute a math requirement.

Human Services	yes	81
	no	18
	No Answer	5
Criminal Justice	yes	78
	no	17
	No Answer	9
Public Administration	yes	93
	no	7
	No Answer	4
Child Care	yes	69
	no	26
	No Answer	9

27. At present, basic skills offerings at the college include math, reading and English courses. Should the college add a basic skills science course to this program?

yes	72
no	28
No Answer	4

28. If your answer to question 27 is yes, should such a course require a laboratory?

yes	33
no	36
No Answer	35

29. How important for HCCC students is technical literacy as distinct from literacy in science or math.

very important	31
somewhat important	12
important	34
of little importance	8
not important	1
don't know	10
No Answer	8

30. Indicate with a number your reponse to each of the following:

6 - Strongly Agree
5 - Agree
4 - Undecided
3 - Disagree
2 - Strongly Disagree
1 - Don't Know

All students at the college should be exposed to a core curriculum which includes at least one science course.

Strongly Agree	58
Agree	32
Undecided	4
Disagree	7
Strongly Disagree	2
Don't Know	0
No Answer	1

All students at the college should be exposed to a core curriculum which includes at least one mathematics course.

Strongly Agree	70
Agree	28
Undecided	0
Disagree	5
Strongly Disagree	0
Don't Know	0
No Answer	1

All students at the college should be exposed to a course on the role of technology in society.

Strongly Agree	33
Agree	37
Undecided	17
Disagree	14
Strongly Disagree	1
Don't Know	1
No Answer	1

The college should place more emphasis than it presently places on the recruitment of minority students into its technology program.

Strongly Agree	27
Agree	25
Undecided	13
Disagree	11
Strongly Disagree	4
Don't Know	21
No Answer	3

A greater proportion of minority students than other students are likely to come to the college with deficiencies in their science preparation.

Strongly Agree	18
Agree	30
Undecided	13
Disagree	14
Strongly Disagree	1
Don't Know	27
No Answer	1

A greater proportion of minority students than other students are likely to come to the college with deficiencies in their mathematics preparation.

Strongly Agree	23
Agree	25
Undecided	16
Disagree	12
Strongly Disagree	3
Don't Know	24
No Answer	1

The addition of general science and technology courses would attract a larger percentage of minority college students to science and technology programs.

Strongly Agree	12
Agree	23
Undecided	22
Disagree	13
Strongly Disagree	4
Don't Know	27
No Answer	3

One general science course would make an important contribution to the ability of non-science graduates to participate in a more informed manner in their roles as citizens.

Strongly Agree	40
Agree	38
Undecided	12
Disagree	6
Strongly Disagree	2
Don't Know	3
No Answer	3

The development of a general science laboratory is among the most important educational needs presently in existence at the college.

Strongly Agree	11
Agree	28
Undecided	16
Disagree	23
Strongly Disagree	9
Don't Know	15
No Answer	2

The development of additional computer assisted instructional opportunities for science and mathematics is among the most important educational needs presently in existence at the college.

Strongly Agree	23
Agree	28
Undecided	16
Disagree	21
Strongly Disagree	3
Don't Know	10
No Answer	3

The development of additional computer facilities for student use is among the most important educational needs presently in existence at the college.

Strongly Agree	27
Agree	28
Undecided	18
Disagree	13
Strongly Disagree	2
Don't Know	14
No Answer	2

31. *What do you consider to be the most important science and mathematics related needs at the college?*

*Most frequently given responses.**

Require at least one science/technology course	22
Require at least one mathematics course	20
Require at least one computer oriented course or computer literacy	14
Development of basic scientific/mathematical thinking skills and problem solving techniques	13
Development of awareness among students of the role of science/mathematics in contemporary society	10

**Sixty-five individuals responded.*

32. Please rank the following student oriented goals in order of importance in a general science course. Use 10 for a most important quality and 1 for the least important quality.

Understand/appreciate interrelationships of science and technology with society

10	31	5	9
9	10	4	3
8	15	3	4
7	9	2	5
6	10	1	3
		No Answer	5

Be able to understand scientific research literature

10	9	5	13
9	3	4	6
8	4	3	14
7	5	2	19
6	4	1	22
		No Answer	5

Develop proficiency in laboratory methods and techniques

10	7	5	12
9	4	4	12
8	5	3	16
7	9	2	15
6	8	1	11
		No Answer	5

Relate knowledge acquired in class to real world systems and problems

10	39	5	6
9	11	4	2
8	15	3	2
7	13	2	2
6	8	1	2
		No Answer	4

Develop appreciation/understanding of scientific method

10	13	5	7
9	14	4	11
8	18	3	4
7	13	2	4
6	15	1	1
		No Answer	4

Gain "hands-on" or field experience in applied practice

10	14	5	16
9	5	4	16
8	9	3	8
7	7	2	4
6	13	1	7
		No Answer	5

Learn to use tools of research in the sciences

10	12	5	14
9	2	4	13
8	13	3	11
7	9	2	9
6	12	1	4
		No Answer	5

Gain qualities of mind useful in further education

10	29	5	8
9	14	4	5
8	16	3	6
7	7	2	4
6	9	1	1
		No Answer	5

Understand self

10	30	5	9
9	12	4	4
8	10	3	6
7	5	2	6
6	3	1	14
		No Answer	5

Develop the ability to think critically

10	45	5	2
9	19	4	1
8	13	3	1
7	7	2	3
6	4	1	5
		No Answer	4

33. Please add any suggestions you may have which will enhance the college's ability to attract racial/ethnic minority students to science/math/technology related programs and courses.

Most frequently given responses.*

Relate programs and courses to job opportunities	13
Advertising and recruitment through minority media and organizations	5
Importance of science in contemporary society	5
Provide support (financial, tutors, counselors, and computers) for science students	4
Strong foundations courses in science and mathematics	3

*Thirty-six individuals responded.

APPENDIX C

STUDENT SURVEY

MISIP STUDENT SURVEY

	FOUNDATIONS (N=90)	BILINGUAL (N=100)	PROGRAM (N=193)	TOTAL (N=383)
1. Sex				
Male	65	48	119	232
Female	24	49	71	144
No Response	1	3	3	7
2. Age				
Below 20	24	10	16	50
20-24	35	28	64	127
25-29	14	13	31	58
30-34	11	23	24	58
35-39	4	9	31	44
40 & Above	2	15	23	40
No Response	-	2	4	6
3. How would you classify yourself?				
Black, not of Hispanic origin	32	-	52	84
Asian(Oriental) or Pacific Islander	4	2	15	21
Hispanic	33	97	55	185
White, not of Hispanic origin	14	-	47	61
Alaskan native or American Indian	-	-	2	2
Other (please specify)	2	-	10	12
No Response	5	1	12	18
4. Were you born in the United States?				
Yes	51	1	115	167
No	39	99	77	215
No Response	-	-	1	1
5. If no, please specify country of birth.				
Africa	3	-	5	8
Asia	5	-	12	17
Caribbean	19	63	33	115
Central & South America	9	29	17	55
Europe	2	-	2	4
No Response	1	7	8	16
6. Is English your native language?				
Yes	47	1	121	169
No	32	99	72	203
No Response	11	-	-	11
7. If no, please specify your native language.				
Spanish	32	99	51	182
Other	10*	-	19**	29
No Response	1	1	2	4

* Eight different languages.
** Eleven different languages.

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
8. How many credits are you taking this semester?				
Part-time	9	35	150	194
Full-time	79	63	42	184
No Response	2	2	1	5
9. How many total credits will you have at the end of this semester?				
1-15	33	43	63	139
16-30	40	44	55	139
31-45	5	1	27	33
46+	4	2	33	39
No Response	8	10	15	33
10. At which location are you taking courses?				
Jersey City State College	-	-	31	31
St. Peter's College	-	-	4	4
Stevens Institute of Technology	-	-	15	15
College Centers (Jersey City)	90	-	142	232
Memorial High School	-	99	-	99
Other (please specify)	-	1	1	2
11. Please indicate the program in which you are currently enrolled.				
Data Processing	-	43	34	77
Accounting	-	23	28	51
Management	-	8	27	35
Secretarial Studies	-	2	12	14
Real Estate and Insurance	-	-	2	2
Child Care	-	2	7	9
Human Services	-	11	11	22
Public Administration	-	1	1	2
Criminal Justice	-	5	17	22
Medical Assisting	-	2	23	25
Medical Record Technician	-	-	9	9
Marine Technology	-	-	-	-
Chemical Laboratory Technology	-	-	7	7
Electronics Technology	-	-	7	7
Foundations (Basic Skills)	90	-	-	90
Other (specify)	-	-	3	3
No Response	-	3	5	8

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
12. Circle the highest grade completed before you entered Hudson County Community College.				
1-6	-	-	2	2
7	1	-	1	2
8	2	-	1	3
9	3	6	3	12
10	10	5	11	26
11	8	4	9	21
12	63	61	140	264
12+	-	21	18	39
Other	3	-	3	6
No Response	-	3	5	8
13. Was the grade indicated above (question 12) completed in a school in the United States?				
Yes	72	13	138	223
No	15	79	44	138
No Response	3	8	11	22
14. List by title each high school or college science (biology, physics, chemistry, earth science, general science, etc.) course you completed before you entered Hudson County Community College.				
General Science	63	26	84	173
Biology	42	61	96	199
Chemistry	19	40	51	110
Physics	13	44	35	92
Earth Science	9	-	19	28
Other	-	-	1	1
No Response	10	16	46	72
I completed no high school or college science courses before I entered Hudson County Community College.	11	23	18	52
15. List by title each mathematics course you completed before you entered Hudson County Community College.				
Mathematics (1-4)	78	34	77	189
Algebra (1&2)	50	43	117	210
Business Math	11	5	28	44
Geometry	20	33	39	92
Trigonometry	4	34	12	50
Accounting	2	1	10	13

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
Bookkeeping	1	1	7	9
Arithmetic	1	4	9	14
Statistics	1	4	-	5
Calculus	2	12	13	27
No Response	9	27	44	80
I completed no high school or college mathematics courses before I entered Hudson County Community College.	5	11	8	24
16. Have you had any experience in using a computer?				
Yes	32	19	85	136
No	56	77	103	236
No Response	2	4	5	11
17. If the answer to question 16 is yes, indicate the type(s) of experiences you have had with a computer.				
Have taken a data processing or computer science course	7	8	42	57
Have used computers for research purposes	3	2	16	21
Have used computers as a part of a computer assisted instruction program	20	8	29	57
Have written computer programs	5	2	22	29
Have used computer for solving problems	9	6	18	33
Other	6	2	10	18

18. Indicate with a number your response to each of the following:

6 - Strongly agree
5 - Agree
4 - Undecided
3 - Disagree
2 - Strongly disagree
1 - Don't know

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
All graduates of Hudson County Community College should take at least one science course.				
6	6	30	25	61
5	33	34	69	136
4	15	8	35	58
3	17	8	35	60
2	2	3	4	9
1	16	4	7	27
No Response	1	13	18	32
All graduates of Hudson County Community College should take at least one mathematics course.				
6	35	36	81	152
5	38	38	83	159
4	6	3	4	13
3	6	4	6	16
2	3	1	1	5
1	2	4	3	9
No Response	0	14	15	29
All graduates of Hudson County Community College should take at least one course in which the role of technology in society is examined.				
6	8	22	38	68
5	26	31	71	128
4	20	9	35	64
3	13	5	18	36
2	5	3	2	10
1	17	11	10	38
No Response	1	19	19	39
All graduates of Hudson County Community College should take at least one computer science or data processing course.				
6	13	25	45	83
5	25	24	74	123
4	14	7	26	47
3	21	13	23	57
2	9	4	1	14
1	7	10	7	24
No Response	1	17	17	35

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
The computer assisted instructional equipment available at HCCC is adequate to meet my needs.				
6	8	8	11	27
5	17	12	37	66
4	22	11	20	53
3	7	13	15	35
2	2	4	5	11
1	30	39	78	147
No Response	4	13	27	44
Most science courses are too difficult for me.				
6	2	1	4	7
5	8	8	23	39
4	12	6	24	42
3	29	42	81	152
2	8	10	21	39
1	29	16	17	62
No Response	2	17	23	42
Most mathematics courses are too difficult for me.				
6	9	2	7	18
5	10	11	15	36
4	8	7	19	34
3	38	35	95	168
2	12	14	26	52
1	12	15	9	36
No Response	1	16	22	39
Most computer science and data processing courses are too difficult for me.				
6	6	2	3	11
5	7	10	17	34
4	11	14	13	38
3	12	23	73	108
2	2	4	18	24
1	50	30	46	126
No Response	2	17	23	42

	FOUNDATIONS	BILINGUAL	PROGRAM	TOTAL
19. If you had to take a science course in order to graduate from Hudson County Community College, indicate with a check the kind of course you would prefer to take.				
General Science	42	44	76	162
Biology	25	13	59	97
Physics	10	10	20	40
Chemistry	20	17	26	63
Other	2	15	-	17
No Response	6	-	-	6
I do have to take a science or technology course in order to graduate.	41	45	63	149
I would not like to take any science or technology course.	17	9	33	59
Why?				
Subject too difficult	5	-	2	7
Subject not interesting or do not like	5	2	3	10
Subject not necessary for program or course	7	3	18	28
Have had enough science	-	3	2	5
No time to study science	-	1	1	2
No reason given	-	-	7	7

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